REMARKS

By the present amendment and response, independent claims 1, 9, and 17 have been amended to incorporate limitations of dependent claims 4, 12, and 18, which have been canceled. Thus, claims 1-3, 5-11, 13-17, and 19-20 are pending in the present application. Reconsideration and allowance of pending claims 1-3, 5-11, 13-17, and 19-20 in view of the following remarks are requested.

In the Office Action dated February 28, 2003, the Examiner has ***finally rejected*** claims 1-3, 5-11, 13-17, and 19-20 pending in the application on the basis of new ground(s) of rejection and newly cited art. Applicant respectfully requests reconsideration and withdrawal of the finality of the rejection of the Office Action dated February 28, 2003.

A good and sufficient reason why the present response is necessary and was not earlier presented is that an entirely new reference has been cited in the present final rejection date February 28, 2003 (37 CFR §1.116(c)). The new reference is Gutsche et al. (USPN 6,177,353) (hereinafter "Gutsche") which is for the first time brought to Applicant's attention by means of the present ***final rejection*** dated February 28, 2003. The new reference, i.e. Gutsche, was not cited in the present application prior to the instant final rejection. Since Gutsche is a reference upon which the Examiner has now relied, Applicant believes that it would be manifestly unfair for the Patent Office not to consider Applicant's arguments, which are necessitated due to the newly cited reference, Gutsche.

By this amendment, Applicant has amended independent claim 1 to incorporate dependent claim 4, independent claim 9 to incorporate dependent claim 12, and independent claim 17 to incorporate dependent claim 18. As a result of the above amendments, no new claim language requiring a search or further consideration has been introduced. As such, a good and sufficient reason exists, as required by 37 CFR §1.116(c), for considering Applicant's present response and withdrawing the finality of the present Office Action.

The Examiner has rejected claims 1-3 and 9-11 under 35 USC §103(a) as being unpatentable over Figures 1a-3b of the present application ("Figures 1a-3b") in view of Gutsche. For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 1 and 9, is patentably distinguishable over Figures 1a-3b and Gutsche.

The present invention, as defined by amended independent claims 1 and 9, teaches, among other things, "an inorganic dielectric ARC layer disposed on the metal layer, wherein said inorganic dielectric ARC layer functions as a hard mask, and wherein said inorganic dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer." As disclosed in the present application, the inorganic dielectric ARC layer may be applied over the metal layer utilizing chemical vapor deposition ("CVD") process, such as a plasma enhanced chemical vapor deposition ("PECVD") process. As a result, the present invention advantageously achieves an inorganic dielectric ARC layer having a substantially uniform thickness over the metal

layer, regardless of whether the metal layer is substantially planar or deviates from planarity.

In contrast to the present invention as defined by amended independent claims 1 and 9, Figures 1a-3b do not teach, disclose, or suggest "an inorganic dielectric ARC layer disposed on the metal layer, and wherein said inorganic dielectric ARC layer functions as a hard mask, wherein said inorganic dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer." Figures 1a-3b disclose metal stack 302 comprising metal layer 314, organic ARC layer 312 and barrier layer 316. The metal stack forms metallic microelectronic structures after a metal etching process. The organic ARC layer 312 of Figures 1a-3b comprises organic material. In contrast, amended independent claims 1 and 9 specify a semiconductor workpiece or metallic stack having an inorganic dielectric ARC layer that functions as a hard mask. Furthermore, Figures 1a-3b fail to teach, disclose, or suggest an inorganic dielectric ARC layer having a substantially uniform thickness over topical non-planarities on a metal layer.

In contrast to the present invention as defined by amended independent claims 1 and 9, Gutsche does not teach, disclose, or suggest "an inorganic dielectric ARC layer disposed on the metal layer ... wherein said inorganic dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer." Gutsche specifically discloses hard mask 510 situated over metal layer 502. See, for example, column 5, lines 24-39 and Figure 5 of Gutsche. However, Gutsche fails to teach,

disclose, or suggest an inorganic dielectric ARC layer having a substantially uniform thickness over topical non-planarites on a metal layer.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claims 1 and 9, is not suggested, disclosed, or taught by Figures 1a-3b and Gutsche, either singly or in combination thereof. As such, the present invention, as defined by amended independent claims 1 and 9, is patentably distinguishable over Figures 1a-3b and Gutsche. Thus claims 2 and 3 depending from amended independent claim 1 and claims 10 and 11 depending from amended independent claim 9 are, *a fortiori*, also patentably distinguishable over Figures 1a-3b and Gutsche for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 7-8 and 17-20 under 35 USC §103(a) as being unpatentable over Figures 1a-3b and Gutsche as applied to claims 1-3 and 9-11, and further in view of U.S. patent number 6,121,133 to Iyer et al. ("Iyer"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 17, is patentably distinguishable over Figures 1a-3b, Gutsche, and Iyer, either singly or in combination thereof.

The present invention, as defined by amended independent claim 17, teaches, among other things, an inorganic dielectric ARC layer, which functions as a hard mask, disposed on a metal layer, and "a residual photoresist layer disposed on said inorganic dielectric ARC layer." As disclosed in the present application, a residual photoresist layer

can remain on the inorganic dielectric ARC layer of a microelectronic structure after completion of a metal etching step. The residual photoresist layer and the inorganic dielectric ARC layer advantageously ensure that the structural integrity of the top portion of the microelectronic structure is preserved.

In contrast to the present invention as defined by amended independent claim 17, Figures 1a-3b do not teach, disclose, or suggest an inorganic dielectric ARC layer, which functions as a hard mask, disposed on a metal layer, and "a residual photoresist layer disposed on said inorganic dielectric ARC layer." Figures 1a-3b disclose metal stack 302 comprising metal layer 314 situated over metal layer 314. However, Figures 1a-3b do not teach, disclose, or suggest a residual photoresist layer disposed on an inorganic dielectric ARC layer.

In contrast to the present invention as defined by amended independent claim 17, Gutsche does not teach, disclose, or suggest a microelectronic structure including "a residual photoresist layer disposed on said inorganic dielectric ARC layer." Gutsche specifically discloses hard mask 512 situated on metal feature 516 after performance of a metallization etching process. See, for example, column 6, lines 19-21 and Figure 8 of Gutsche. However, Gutsche fails to teach, disclose, or suggest a microelectronic structure including a residual photoresist layer disposed on an inorganic dielectric ARC layer.

In contrast to the present invention as defined by amended independent claim 17, Iyer does not teach, disclose, or suggest a microelectronic structure including "a residual photoresist layer disposed on said inorganic dielectric ARC layer," where the inorganic

dielectric ARC layer is disposed on a metal layer. Iyer specifically discloses an oxidation diffusion barrier stack comprising silicon wafer 200, pad oxide layer 202, first silicon nitride layer 226, inorganic ARC layer 206, second silicon nitride layer 210, and photoresist layer 214, where photoresist layer 214 is situated over second nitride layer 210. See, for example, column 8, lines 13-59 and Figure 2E of Iyer. However, in Iyer, oxidation diffusion barrier stack does not include a metal layer or a hard mask. Furthermore, Iyer does not teach, disclose, or suggest a residual photoresist layer disposed on an inorganic dielectric ARC layer.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 17, is not suggested, disclosed, or taught by Figures 1a-3b, Gutsche, and Iyer, either singly or in combination thereof. As such, the present invention, as defined by amended independent claim 17, is patentably distinguishable over Figures 1a-3b, Gutsche, and Iyer. Thus claims 19 and 20 depending from amended independent claim 17 are, *a fortiori*, also patentably distinguishable over Figures 1a-3b, Gutsche, and Iyer for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 4-6 and 13-14 under 35 USC §103(a) as being unpatentable over Figures 1a-3b and Gutsche as applied to claims 1-3 and 9-11, and further in view of U.S. patent number 6,200,909 to Torek et al. ("Torek"). For the reasons discussed below, Applicant respectfully submits that the present invention, as

defined by amended independent claims 1 and 9, is patentably distinguishable over Figures 1a-3b, Gutsche, and Torek, either singly or in combination thereof.

As discussed above, the present invention, as defined by amended independent claims 1 and 9, is patentably distinguishable over Figures 1a-3b and Gutsche. Also, in contrast to the present invention, as defined by amended independent claims 1 and 9, Torek does not teach, disclose, or suggest "an inorganic dielectric ARC layer disposed on the metal layer, and wherein said inorganic dielectric ARC layer functions as a hard mask, wherein said inorganic dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer." Torek specifically discloses Darc layer 24 situated over oxide layer 20. See, for example, column 3, lines 12-13 and Figure 3 of Torek. However, Torek fails to teach, disclose, or suggest an inorganic dielectric ARC layer, which functions as a hard mask, disposed on a metal layer. Consequently, Torek also fails to teach, disclose, or suggest an inorganic dielectric ARC layer having a substantially uniform thickness over topical non-planarities on a metal layer.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claims 1 and 9, is not suggested, disclosed, or taught by Figures 1a-3b, Gutsche, and Torek, either singly or in combination thereof. As such, the present invention, as defined by amended independent claims 1 and 9, is patentably distinguishable over Figures 1a-3b, Gutsche, and Torek. Thus claims 5 and 6 depending from amended independent claim 1 and claims 13 and 14 depending from amended independent claim 9 are, *a fortiori*, also patentably distinguishable over Figures

1a-3b, Gutsche, and Torek for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 15-16 under 35 USC §103(a) as being unpatentable over Figures 1a-3b and Gutsche as applied to claims 1-3 and 9-11, and further in view of U.S. patent number 6,166,427 to Huang et al. As discussed above, amended independent claim 9 is patentably distinguishable over Figures 1a-3b and Gutsche. Thus claims 15-16 depending from amended independent claim 9 are also patentably distinguishable over Figures 1a-3b and Gutsche.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1, 9, and 17 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. For all the foregoing reasons, an early Notice of Allowance for all pending claims 1-3, 5-11, 13-17, and 19-20 is respectfully requested.

Respectfully Submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 1 has been amended as follows:

1. (Twice Amended) A semiconductor workpiece, comprising:

a metal layer;

an inorganic dielectric ARC layer disposed on the metal layer, wherein said inorganic dielectric ARC layer functions as a hard mask, and wherein said inorganic dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer; and

a photoresist layer disposed on the ARC layer opposite the metal layer.

Claim 4 has been canceled.

Claim 9 has been amended as follows:

9. (Twice Amended) A metallic stack for a semiconductor interconnect, comprising:

a metal layer;

an inorganic dielectric ARC layer disposed on the metal layer, wherein said inorganic dielectric ARC layer functions as a hard mask, and wherein said inorganic

dielectric ARC layer has a substantially uniform thickness over topical non-planarities on the metal layer; and

a barrier layer disposed on the metal layer opposite the ARC layer.

Claim 12 has been canceled.

Claim 17 has been amended as follows:

17. (Once Amended) A semiconductor device, comprising:

an oxide layer formed on a wafer; and

at least one microelectronic structure extending from the oxide layer and including:

a barrier layer disposed on the oxide layer;

a metal layer disposed on the barrier layer; [and]

an inorganic dielectric ARC layer disposed on the metal layer,

wherein said inorganic dielectric ARC layer functions as a hard mask; and

a residual photoresist layer disposed on said inorganic dielectric ARC layer.

Claim 18 has been canceled.